

FAX

Solvay Minerals Inc. ENVIRONMENTAL DEPARTMENT

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Date January 15, 1997

Number of pages including cover sheet 7

To: Charles C. Leivo

From: Dolly Potter

Phone 307-872-6571

cc: Aileen Castaneda

Fax Phone 307-872-6510

Kvaerner Davy

Charles:

Following are test results of our existing gas-fired calciner and dryer, utilizing EPA Methods 5 and 202. I have also enclosed further information concerning the method.

If you want a copy of the actual EPA Method 202, or have any questions, feel free to contact me at (307) 872-6571.

Dolly A. Potter

Environmental Engineer
Solvay Minerals, Inc.

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For particulate emission testing, the Wyoming Department of Environmental Quality (WDEQ) requires utilization of Reference Method 5 sampling train, with the back half impinger catch analyzed by the protocol defined by Reference Method 202. To determine compliance, the WDEQ will compare the sum of the Reference Method 5 front half particulate catch and the inorganic portion of the Reference Method 202 back half of this Method 5/202 test, against the guaranteed particulate emission rate.

RESULTS

2-6

Table 2-6
EP6 Dryer Stack - Particulate and Condensibles

Run No.		2	3	4	Average
Date (1994)		August 11	August 11	August 11	
Start Time (approx.)		11:20	14:01	16:41	
Stop Time (approx.)		13:30	16:12	18:53	
<u>Gas Conditions</u>					
T _s	Temperature (°F)	309	308	310	309
B _{wo}	Moisture (volume %)	49.38	49.94	49.96	49.76
O ₂	Oxygen (dry volume %)	7.6	7.3	7.2	7.4
CO ₂	Carbon dioxide (dry volume %)	7.5	7.7	7.8	7.7
<u>Volumetric Flow Rate</u>					
Q _a	Actual conditions (acfm)	78,800	75,680	74,510	76,330
Q _{std}	Standard conditions (dscfm)	21,930	20,840	20,460	21,080
<u>Front Half Particulate</u>					
C	Concentration (gr/acf)	0.0001	0.0001	0.0001	0.0001
C	Concentration (gr/dscf)	0.0004	0.0003	0.0003	0.0003
E	Emission rate (lb/hr)	0.07	0.05	0.06	0.06
<u>Back Half Organic Particulate</u>					
C	Concentration (gr/acf)	0.0001	0.0001	0.0001	0.0001
C	Concentration (gr/dscf)	0.0004	0.0005	0.0004	0.0004
E	Emission rate (lb/hr)	0.08	0.09	0.07	0.08
<u>Back Half Inorganic Particulate</u>					
C	Concentration (gr/acf)	0.0022	0.0001	0.0008	0.0011
C	Concentration (gr/dscf)	0.0078	0.0005	0.0031	0.0038
E	Emission rate (lb/hr)	1.47	0.10	0.54	0.70
<u>Total Particulate</u>					
C	Concentration (gr/acf)	0.0024	0.0004	0.0011	0.0013
C	Concentration (gr/dscf)	0.0086	0.0013	0.0038	0.0046
E	Emission rate (lb/hr)	1.62	0.24	0.68	0.84

→ Add together for "particulate emission rate"

0.0041 gr/dscf
0.76 PPH

Designed at 0.016 gr/dscf
34,953 DSCFM 4.8 PPH

Revision 1

RESULTS

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Table 2-2
EP5 Calciner Stack - Particulate and Condensibles

Run No.		2	3	4	Average
Date (1994)		August 2	August 2	August 3	
Start Time (approx.)		12:07	15:15	07:15	
Stop Time (approx.)		14:26	17:45	09:32	
<u>Gas Conditions</u>					
T _s	Temperature (°F)	350	352	351	351
B _{wo}	Moisture (volume %)	39.29	38.50	38.84	38.88
O ₂	Oxygen (dry volume %)	7.6	7.7	8.1	7.8
CO ₂	Carbon dioxide (dry volume %)	15.2	15.0	12.1	14.1
<u>Volumetric Flow Rate</u>					
Q _a	Actual conditions (acfm)	149,000	139,000	119,500	135,800
Q _{std}	Standard conditions (dscfm)	47,010	44,330	37,890	43,080
<u>Front Half Particulate</u>					
C	Concentration (gr/acf)	0.0006	0.0005	0.0005	0.0005
C	Concentration (gr/dscf)	0.0018	0.0016	0.0016	0.0016
E	Emission rate (lb/hr)	0.71	0.59	0.52	0.61
<u>Back Half Organic Particulate</u>					
C	Concentration (gr/acf)	0.0071	0.0090	0.0078	0.0080
C	Concentration (gr/dscf)	0.0224	0.0282	0.0247	0.0251
E	Emission rate (lb/hr)	9.01	10.71	8.01	9.24
<u>Back Half Inorganic Particulate</u>					
C	Concentration (gr/acf)	0.0024	0.0036	0.0026	0.0029
C	Concentration (gr/dscf)	0.0075	0.0114	0.0083	0.0091
E	Emission rate (lb/hr)	3.01	4.34	2.68	3.35
<u>Total Particulate</u>					
C	Concentration (gr/acf)	0.0100	0.0131	0.0109	0.0113
C	Concentration (gr/dscf)	0.0316	0.0412	0.0345	0.0358
E	Emission rate (lb/hr)	12.73	15.64	11.21	13.19

→ Add together for "particulate emission" rate:

0.0107 gr/dscf
3.96 PPH

Designed at ~~0.0107~~ 0.02 gr/dscf
54,507 DSCFM, 9.34 PPH

Revision 1

METHODOLOGY

PARTICULATE EMISSIONS - EPA METHODS 5 AND 202

EPA Methods 5 and 202 were used to measure particulate matter at the EP1 and 2 Calciner Stack, EP5 Calciner Stack and EP6 Dryer Stack. EPA Method 5 defines particulate matter as any material that is collected before or on the surface of a glass fiber filter. EPA Method 202 measures the condensible particulate matter which collects after the filter. Stack gas was isokinetically withdrawn through a temperature-controlled probe and high-efficiency glass fiber filter.

Figure 4-4 illustrates the EPA Method 5/202 sampling apparatus which was used. The sampling apparatus contained a glass lined temperature-controlled probe equipped with a Type S pitot tube (for measuring stack gas flow rate) and a sharp-edged glass button-hook nozzle. The exit of the probe was connected to a Whatman 934 AH high efficiency glass fiber filter supported in a glass filter holder. The exit of the filter holder connected to a series of four full size impingers. The first three impingers each contained 100 milliliters of distilled water. The fourth contained a tared quantity of silica gel. The sample gas exiting the last impinger was maintained at a temperature below 68°F for the duration of each test. In accordance with EPA Method 202 requirements, all glassware was cleaned prior to testing with soap and water, rinsed with water, acetone and finally methylene chloride.

Procedures for selecting sampling locations and for operation of the apparatus were derived from EPA Method 5 and associated EPA Methods 1 through 4. The sampling apparatus was leak-checked before and after each test run. Sampling was performed at an isokinetic rate greater than 90% and less than 110%.

At the conclusion of each test run, the probe, nozzle and front-half filter holder were rinsed and brushed with acetone. The acetone rinse was collected into a pre-cleaned glass sample container. The glass fiber filter and associated particulate catch were recovered quantitatively into the original filter container and sealed. The impinger liquid was recovered quantitatively into a pre-cleaned glass sample container. The volume of liquid collected in each of the impingers was quantified for EPA moisture calculations. The impingers were rinsed with distilled water, and the rinses were added to the storage container. The impingers were then rinsed with methylene chloride, which was collected in a separate pre-cleaned glass container. All containers were labeled and sealed for shipment to the laboratory.

Particulate samples collected on the filters were analyzed gravimetrically to a constant weight by CAE in Denver, Colorado. The probe and nozzle wash was transferred to tared beakers, evaporated to dryness and weighed to a constant weight by CAE in Palatine, Illinois.

METHODOLOGY

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PARTICULATE EMISSIONS (CONTINUED)

The EPA Method 202 particulate analyses were performed by the Clean Air Engineering laboratory located in Palatine, Illinois. The impinger water was extracted by adding the contents of the methylene chloride rinse to the impinger water and separating the layers in a separatory funnel. An additional 150 milliliters of methylene chloride was added to the funnel to complete the extraction. The organic extract fraction was placed into a tared beaker, evaporated at room temperature to dryness, desiccated for 24 hours and weighed to a constant weight. The aqueous inorganic fraction was taken to near dryness in an oven at 220°F, evaporated at room temperature to dryness, desiccated for 24 hours and weighed to a constant weight. The weight differentials for the organic and aqueous fractions were combined to determine the condensible particulate matter. The weight differentials of the filter and acetone washes were added to the condensible particulate matter weight to determine total particulate matter.

METHODOLOGY

PARTICULATE EMISSIONS (CONTINUED)

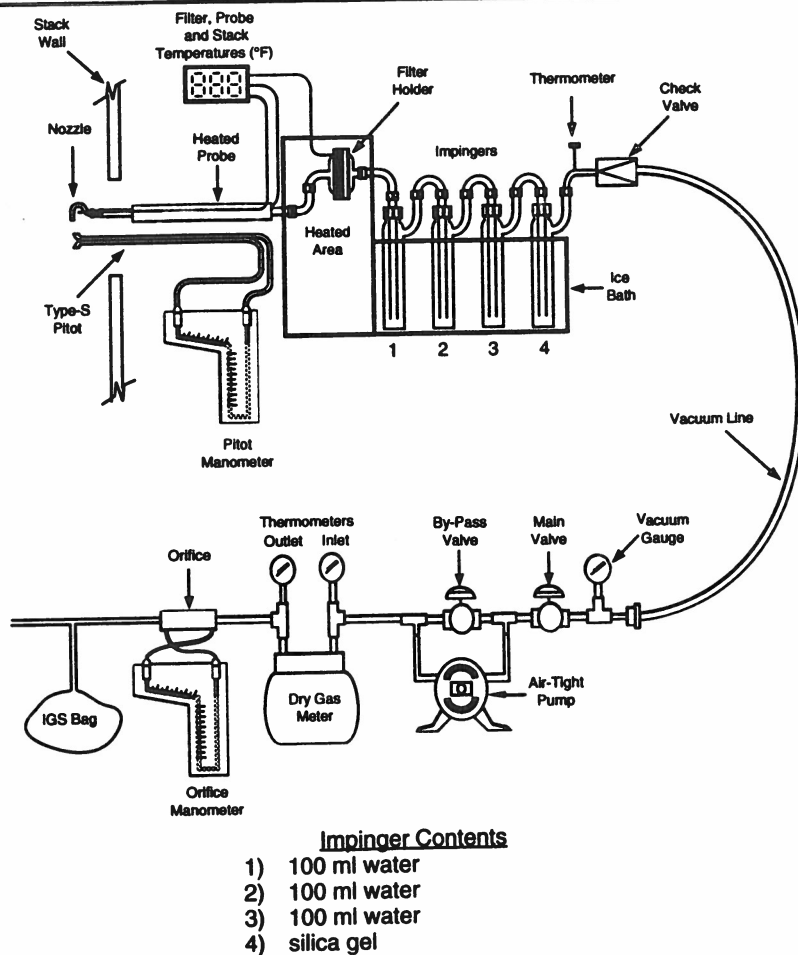


Figure 4-4: Particulate Sampling Apparatus (EPA Method 5/202)